Tanuj Thakkar

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Education

University of Maryland - College Park, USA **Aug 2021 - (Expected) May 2023**
Master of Engineering in Robotics GPA - 3.90/4
Courses: Computational Imaging, Robot Modeling, Control for Robotic Systems, Classical and Deep Learning Methods for Computer Vision, Perception and Planning for Autonomous Robots, Intro to Maching Learning, Software Development** **Currently Enrolled*

Charotar University of Science and Technology, India **Jul 2017 - May 2021**
Bachelors of Technology in Computer Science and Engineering

Skills

Languages : C, C++, Python, MATLAB
Platforms : Nvidia Jetson TX2, Ardupilot, Raspberry Pi, Arduino
Software : ROS, Gazebo, Rviz, MoveIt, SolidWorks, Blender
Libraries : OpenCV, NumPy, Git, Pandas, PCL, Tensorflow, Pytorch
Deep Learning Networks : VGG16, ResNet, ResNeXt, DenseNet, HomographyNet
Domain Skills : Robot Perception, Computer Vision, Motion Planning, Mapping & Localization, Deep Learning

Publications

T. Thakkar, Arpita Sinha, "Motion Planning for Tractor-Trailer System", *at Indian Control Conference (ICC), 2021* [Paper]
T. Thakkar, "Path Planning for Autonomous Tractor-Trailer System", *2021 (Bachelor's Thesis)* [Thesis]

Work Experience

Autonomy Engineer |Phantom Auto, San Fransico, USA **June 2022 - present**
Mapping & Localization for Indoor Logistic Vehicle
Mentor - Ehud Spiegel
- Investing and evaluating various mapping and localization techniques for indoor logistic vehicles operating in a highly-dynamic, co-operative warehouse environments
- Developing the navigation pipeline for a fleet of tele-operated indoor logistic vehicles

Researcher | *Perception & Robotics Group, University of Maryland - College Park*, USA **Aug 2021 - Jan 2022**
Perception and Planning for Micro-Aerial Vehicles (MAVs)
Mentor - Prof. Yiannis Aloimonos
- Worked on vision-based navigation techniques for Micro-Aerial Vehicles (MAVs) in cluttered indoor and outdoor environments

Research Intern | *Indian Institute of Technology - Bombay*, India **Jan 2021 - Jul 2021**
Motion Planning for Tractor-Trailer System [GitHub] [Thesis] [Paper]
Mentor - Prof. Arpita Sinha
- Adapted the **Hybrid A*** algorithm for tractor-trailer systems and designed an indoor simulation environment for **Gazebo**
- Developed and implemented **Voronoi based Hybrid A*** algorithm by extending Hybrid A* in **C++** for **ROS**
- Achieved a **~21x improvement** in execution time with a **~32x reduction** in iterations and **~36x reduction** in nodes generated
- Implemented a **two-level Pure Pursuit controller** to demonstrate the planned paths are drivable

Research Intern | *Charotar University*, India **May 2020 - June 2020**
Collaborative Robotics [Report] [Video]
Mentor - Prof. Jesal Desai
- Simulated a collaborative task using the **UR5 Arm** and **Turtlebot 2** in a warehouse environment
- Implemented a **state-machine** to divide operations across robots to perform the given tasks

Selected Projects

Autonomous Exploration Developed a computer vision based wavefront exploration algorithm ***Mar 2022***
Image Stitching Developed a pipeline to **generate panoramas** from frames using classical computer vision methods including corner detection, **ANMS**, feature matching, and **RANSAC** for **homography estimation** **Jan 2022**
Deblurring Motion Blur Implemented **Convolutional Neural Networks (CNNs)** based on **ResNet** and **MultiResNet** architectures to deblur motion blurred images from the GOPRO dataset [Report] **Dec 2021**
Optimus Designed a dynamic all terrain semi-amphibious differential drive robot for highly hazardous scenarios with **multiple manipulators** in **ROS** [Report] [GitHub] **Dec 2021**
Path Planning Analysed results of **Dijkstra, A*, RRT, PRM** over multiple tests and scenarios to compare execution efficiency and path optimality [Report] [Video] [GitHub] **Oct 2020**

Responsibilities

Robotics Tutor | *University of Maryland - College Park* **Jan 2022 - May 2022**
- Tutoring for the **ROS** based **ENAE450 Robotics Programming course** at Maryland Robotics Center

Technical Advisor | *Google Developers Student Group* **Feb 2019 - Aug 2019**
- Hosted events organized by the group (usually attended by **over a 100 students**)
- Responsible for technical and logistic operations of workshops and seminars